DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB 56

Endangered and Threatened Wildlife and Plants; Proposed Rule to List the Mexican Spotted Owl as Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) proposes to list the Mexican spotted owl (*Strix occidentalis lucida*) as a threatened species under the authority contained in the Endangered Species Act of 1973 (Act), as amended. Critical habitat is not being proposed. This medium-sized bird is found from parts of central Colorado and Utah south through Arizona, New Mexico, and western Texas, then south through northwestern Mexico to the State of Michoacan. It commonly inhabits mountains and canyons containing dense, uneven-aged forests with a closed canopy. The Mexican spotted owl is threatened by habitat loss caused by logging and fires, increased predation associated with habitat fragmentation, and lack of adequate protective regulations.

DATES: Comments from all interested parties must be received by March 3, 1992.

The Act requires the Service to promptly hold one public hearing on the proposed listing regulation should a person file a request for such a hearing by December 19, 1991 (section 4(b)(5)(E); 16 U.S.C. 1533(b)(5)(E)). Because of anticipated widespread public interest, the Service has decided to hold six public hearings. See **"SUPPLEMENTARY INFORMATION"**.

ADDRESSES: Comments and materials concerning this proposal should be sent to the Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services Field Office, 3530 Pan American Highway, NE, Suite D, Albuquerque, New Mexico 87107. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Field Supervisor, (see ADDRESSES) (505/883-7877 or FTS 474-7877). See **"SUPPLEMENTARY INFORMATION"** for location of hearings.

SUPPLEMENTARY INFORMATION:

Hearing Information

Public hearings will be held between January 15, 1992, and February 28, 1992, in the following sites: Arizona—Flagstaff, Tucson; New Mexico—Alamogordo, Santa Fe, Silver City; Utah—Cedar City. Specific dates and localities will be announced in a subsequent **Federal Register** notice.

A public hearing will be conducted in each of these cities from 6 p.m. to 9 p.m. Oral statements may be limited to 3, 5, or 10 minutes if the number of parties desiring to give such statements necessitates limitation. There are no limits to the length of any written statement presented at a hearing or mailed to the Service. Oral comments presented at the public hearings are given the same weight and consideration as comments presented in written form. Should the public hearings scheduled be insufficient to provide all individuals with an opportunity to speak, anyone not accommodated will be requested to submit their comments in writing.

Background

The Mexican spotted owl is one of three spotted owl subspecies recognized by the American Ornithologists' Union (AOU) (AOU 1983). It was described from a specimen collected at Mount Tancitaro, Michoacan, Mexico, and named *Syrnium occidentale lucidum* (Nelson 1903). The spotted owl was later assigned to the genus *Strix* (Ridgway 1914). Specific and subspecific names were changed to conform to taxonomic standards and became *Strix occidentalis lucida*. Monson and Phillips (1981) regard spotted owls in Arizona as *Strix occidentalis hauchucae*, noting they are paler than *S. o. lucida* from Mexico; however their treatment is not followed by the AOU (1983).

The Mexican spotted owl (*S. o. lucida*) is distinguished from the California (*S. o. occidentalis*) and northern (*S. o. caurina*) subspecies chiefly by geographic distribution and plumage. Generally, the background coloration of the Mexican spotted owl is a darker brown than the California and northern subspecies. The plumage spots are larger, more numerous and whiter in *S. o. lucida*, giving it a lighter appearance overall.

Using starch-gel electrophoresis to examine genetic variability among the three spotted owl subspecies, Barrowclough and Gutierrez (1990) found *S. o. lucida* to be distinguishable from the two other subspecies by a significant difference in allelic frequency at one locus. They conclude this genetic variation, and the prolonged geographic isolation of the Mexican subspecies it suggests, indicate the Mexican spotted owl may represent a species distinct from the California and northern spotted owls.

The Mexican spotted owl is the widest ranging of the three spotted owl subspecies. Its range extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona and New Mexico and, discontinuously, through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau. There are no estimates of the owl's historic population size. Its historic range and present distribution are thought to be similar.

Utah—The earliest spotted owl record in Utah was from Zion National Park (ZNP) in June, 1928 (Hayward *et al.* 1976). The most northerly owl occurrence in the Southwest was recorded September 6, 1958, in the Book Cliffs of northeastern Utah (Behle 1960). The most significant population of spotted owls in Utah occurs in ZNP. Surveys between 1987 and 1990 have recorded six pairs and six single birds (Gutierrez and Rinkevich 1990).

Spotted owls appear largely absent from higher elevations in Utah. The only occurrences have been a 1958 sighting in an aspen grove (Behle 1960), and a 1990 calling response at 10,000 feet elevation on the Manti-LaSal National Forest

(United States Forest Service (USFS), *in litt.*, 1990).

Current spotted owl records (*i.e.*, those recorded since 1988) for Utah total 8 pairs and 11 single birds (McDonald *et al.* 1991).

Colorado—There are 20 historic records of spotted owls for Colorado (Reynolds 1989), of which 13 have been accepted as valid by the Colorado Rare Birds Committee. These records come from the San Juan Mountains in southwestern Colorado and along the Front Range northward to the vicinity of Denver.

Current spotted owl records for Colorado total two pairs and 10 single birds (McDonald *et al.* 1991).

Arizona—There are few early spotted owl records for Arizona. The earliest record is of a pair nesting in a cottonwood northeast of Tucson in 1872. A pair was found in the foothills of the Huachuca Mountains in 1890 (Bendire 1892).

The historic and current distribution of spotted owls in Arizona coincide, with the possible exception of the current absence of owls from lower elevation riparian forests. Bendire (1892) found a pair of spotted owls nesting in cottonwoods northwest of Tucson in 1872, and Willit found them in lowland riparian areas in the vicinity of Roosevelt Lake (Salt River) in the 1910's (Phillips *et al.* 1964). These records suggest spotted owls may have formerly occurred in low elevation riparian habitats.

Spotted owls are known from the Colorado Plateau in northern Arizona, the basin and range mountains of the southeast, and the rugged transition zone between these provinces in central and east central Arizona. The largest concentration of spotted owls occurs in central and east central Arizona along the Mogollon Rim, in the White Mountains, and on the volcanic peaks near Flagstaff. This region takes in all or part of five national forests and two Indian reservations. The number of currently known owls reported by various agencies for this region totals 124 pairs and 77 single birds.

Current spotted owl records for Arizona total 153 pairs and 108 single birds (McDonald *et al.* 1991).

New Mexico—There are numerous early spotted owl records for New Mexico. Spotted owls were known prior to 1928 from most of New Mexico's major mountain ranges including the Sangre de Cristo, Jemez, Manzano, Sacramento, Mogollon, Tularosa, San Fransicso, San Mateo, and Black Range. Many records from southwest New Mexico were the result of the work of J.S. Ligon who collected throughout New Mexico from about 1910 through 1930. Ligon observed spotted owls over an extensive range in New Mexico and Arizona, but found them most commonly in south central and southwest New Mexico and at similar latitudes in Arizona (Ligon 1926). Recent historic records document spotted owls from most other mountain ranges in New Mexico (Ligon 1961, Hubbard 1978).

Current spotted owl records for New Mexico total 129 pairs and 85 single birds (McDonald *et al.* 1991).

Texas—All Texas spotted owl records come from the Guadalupe Mountains near the New Mexico border. An owl was first reported in 1901 (Bailey 1928). A pair of owls was observed in the Guadalupe Mountains in 1988 (NPS, *in litt.*, 1990).

Current spotted owl records for Texas total 1 pair of birds.

Mexico—Information on spotted owl occurrence in Mexico is somewhat limited. Nevertheless, specimen and sight records obtained over the past 120 years provide a fair understanding of the owl's general distribution and at least an indirect assessment of relative abundance.

A survey of major museum collections found spotted owl specimens from Mexico collected from about 1870 through 1961, which represent 14 locations in 7 states, as follows: Sonora, 4 specimens from 4 sites; Chihuahua, 13 from 5 sites; Jalisco, 2 from 1 site; Michoacan, 1 from 1 site; Guanajuato, 1 from 1 site, San Luis Potosi, 2 from 1 site; and Nuevo Leon, 1 from 1 site. There are sight records from an additional four localities in Sonora and three localities in Chihuahua, plus individual sight records from Durango and Coahuila, two states for which no specimens are available. There are a total of 23 Mexican localities (McDonald *et al.* 1991). The great majority of specimens and sight records are concentrated near the U.S. border in northeastern Sonora and northwestern Chihuahua, with large gaps in the known distribution and very few records south and east of there. Although precise numbers of spotted owls in Mexico are unknown, available evidence suggests the species has always been uncommon in that country.

Current spotted owl records for Mexico total one pair (J.A. Olivo-Martinez, *in litt.*, 1990), but no organized owl surveys have been conducted in that country.

Current (*i.e.* since 1988) spotted owl records for the southwestern United States and Mexico total 294 pairs and 214 singles (802 birds) (McDonald *et al.* 1991).

An estimate of the total spotted owl population in the southwestern United States was derived primarily from data supplied by the USFS (Fletcher 1990) and data available in other USFS documents. Data considered in the calculations included total estimated timberland within national forests in Arizona and New Mexico, total estimated timberland outside national forests in Arizona and New Mexico, estimated suitable spotted owl habitat on national forests in Arizona and New Mexico, spotted owl sightings on national forests in Arizona and New Mexico, acres searched for spotted owls on national forests in Arizona and New Mexico, sight pair occupancy rates reported from formal monitoring on three national forests in Arizona and New Mexico, and records of owl occurrences in Utah and Colorado. These data provide a Service estimate of Mexican spotted owls in the southern United States in 1990 of 806 pairs and 548 singles for a total estimated population of 2,160 owls (McDonald *et al.* 1991). Data are insufficient to make an estimate of the total Mexican spotted owl population in Mexico.

The Mexican spotted owl occupies varied vegetative habits but these usually contain certain common characteristics (Ganey *et al.* 1988, Ganey and Balda 1989b, Fletcher 1990). These characteristics include high canopy closure, high standard density, and a multilayered canopy resulting from an uneven-aged stand. Other characteristics include downed logs, snags, and mistletoe infection which are indicative of an old grove and absence of active management. Much of the owl habitat is characterized by steep slopes and canyons with rocky cliffs.

The vegetative communities occupied by the Mexico spotted owl consist primarily of warm-temperature and cold-temperate forests, and to a lesser extent woodlands and riparian deciduous forest. The mixed-conifer community appears to be most frequently used.

Mixed-conifer forests contain several species of overstory trees, mostly white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), and ponderosa pine (*Pinus ponderosa*) with lesser amounts of southwestern white pine (*P. strobiformis*), limber pine (*P. flexilis*), aspen (*Populus tremuloides*), and corkbark fir. (*Abies lasiocarpa* var. *arizonica*).

The understory of mixed-conifer is important because Mexican spotted owls usually roost in these trees. The understory usually contains the same conifer species found in the overstory

plus Gambel oak (*Quercus gambelii*), maples (*Acer grandidentatum* and *A. glabrum*), and New Mexico locust (*Robinia neomexicana*). Montane riparian canyon bottoms used by owls in the mixed-conifer zone may contain boxelder (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), maples (*Acer* spp.), and alders (*Alnus* spp.).

The vegetative communities used by the owl vary across its range. In southeastern Arizona, habitat use is approximately equally split between mixed-conifer (36.9 percent) and Madrean Evergreen Forest and Woodland (33.3 percent) (Ganey and Balda 1989b), which occurs below the mixed-conifer zone. There are two series of Madrean Evergreen Woodland, the upper oak-pine at 5,500 to 7,200 feet, and the lower evergreen oak (encinal) at 5,000 to 6,500 feet. Dominant trees in the Madrean oak-pine zone are Apache pine (*Pinus englemannii*), Chihuahua pine (*P. leiophylla*), and Arizona pine (*P. ponderosa* var. *arizonica*) with silverleaf oak (*Quercus hypoleucoides*) and netleak oak (*Q. rugosa*). Common oak species in the evergreen oak zone are Emory oak (*Q. emoryi*), Arizona white oak (*Q. arizonica*), Mexican blue oak (*Q. oblongifolia*), and Gray oak (*Q. grisea*). Within these vegetative zones, Mexican spotted owls are usually found in steep, forested canyons with rocky cliffs, especially at the lower elevations.

In northeastern Arizona, southwestern Colorado, and Utah, at the northern edge of their range, Mexican spotted owls may occur year around at 4,400 to 6,800 feet within the piñon-juniper zone (*Pinus edulis* and *Juniperus osteosperma*) below the mixed-conifer forests. These habitats are characterized by narrow, shady, cool canyons in sandstone slickrock (Gutierrez and Rinkevich 1990; NPS, *in litt.*, 1990). Although no studies have been done, it is believed most of the owl's activity is within the canyons. The owls actually roost in canyon bottom riparian vegetation with cottonwoods (*Populus fremontii*) and boxelder or on ledges or cavities in the slickrock canyon walls within the piñon-juniper zone (Willey, *in litt.*, 1990).

The habitat characteristics of high canopy closure, high stand density, a multilayered canopy, uneven-aged stands, numerous snags, and downed woody matter are best expressed in old-growth mixed-conifer forests (200+ years old). These characteristics may also develop in younger stands that are unmanaged or minimally managed, especially when the stands contain remnant large trees or patches of large trees from earlier stands. For three paids of radio-monitored owls in northern Arizona, Ganey and Balda (1988) found an average of 995 acres of old-growth forest within the 2092 acre average home range. Fletcher (1990) reported an average of 154 acres of old-growth forest within the management territories (MT's) of 359 spotted owls or owl pairs in Arizona and New Mexico. MT's averaged 2,055 acres and were established around owl roost or nest sites based on biologists' best judgement of suitable habitat.

The range of habitats for nesting owls appears more restricted than that for foraging or roosting owls. Areas with high canopy closure and at least a few old-growth trees are usually selected. Fletcher (1990) analyzed the characteristics of 22 nest sites in Arizona and New Mexico. Nesting occurred most frequently in the mixed-conifer community type (16) followed by the pine-oak community type (3). The remaining three nest sites occurred in riparian (2) and white fir (1) communities. The mixed-conifer and pine-oak community types were used significantly more than expected based on availability. No nests were found in the ponderosa pine community type in this study even though it makes up 40 percent of USFS estimated suitable habitat in Arizona and New Mexico. Witches'-broom and tree stick platforms were the most frequently used nesting substrates (12); tree cavities, mostly in gambel oak, were also used frequently (8), and two nests were on cliff ledges. Tree species used were Douglas fir (9), gambel oak (6), white fir (3), and ponderosa pine (1). Except for ponderosa pine, the trees were of moderate to large diameter and height for their species. Most trees were on moderate to steep slopes at elevations ranging from 6,000 to 8,000 feet. Most nest trees occurred on northern or eastern facing slopes indicating a preference for the cooler portion of the overall habitat.

Limited information is available on the reproductive biology of the Mexican spotted owl. Owls most commonly lay eggs in April (Ligon 1926, Johnson and Johnson 1985, Skaggs 1988) but eggs have been found as early as March 2 (Skaggs 1988). Clutch size varies from 1 to 3 eggs (rarely four) with most broods containing 1 or 2 owlets (Bendire 1892, Ganey and Balad 1988). However, broods of 3 occurred occasionally in southern New Mexico where Skaggs (1988) reported 2 of 13 broods contained 3 owlets.

The incubation period is approximately 30 days and most eggs hatch by the end of May. Incubation is carried out solely by the female. Males provide food for the female and young until the owlets are about two weeks old. The female then assists in capturing food for the young (Johnson and Johnson 1985).

The female roosts at the nest until 3 to 6 days before the young fledge. Most owlets fledge in June, 34–36 days after hatching (Ganey and Balda 1988). Owlets are unable to fly when they first leave the nest. Owlets become increasingly proficient at flight throughout the summer and are "semi-independent" by late August or early September although juvenile begging calls have been heard as late as September 30 (Ganey and Balda 1988). Young are fully independent by early October, although they have not begun to disperse.

There can be a wide range or reproductive rates between years. Reproductive success on the Coconino, Lincoln, and Santa Fe National forests was determined in 1989 and 1990 (Fletcher 1990). In 1989, 39 monitored sites had an average reproductive rate of 0.67 female young per pair. In 1990, 18 monitored sites had an average reproductive rate of 0.06 female young per pair. The low reproductive rate in 1990 was likely attributable to drought conditions affecting prey availability. Ganey (1988), in a non-systematic study of nesting success in Arizona from 1984 through 1987 found a reproductive rate of 0.32 female young per pair. Skaggs and Raitt (1988) found a reproductive rate of 0.20 female young per pair during one nesting season on the Lincoln National forest. No data are available on dispersal and age specific survival of the Mexican spotted owl, or are there data on the demographic structure of populations.

Most of the information on Mexican spotted owl home range characteristics, size, and use is based on a telemetry study conducted in northern Arizona on eight radio-tagged spotted owls (Ganey and Balda 1989a). Home range size for single owls varied 702 to 2,386 acres, with an average size of 1,601 acres. The combined home ranges occupied by pairs averaged 2,092 acres. An Average of 66 percent of a pair's home range was used by both owls. The areas of overlap were the nest area, the primary roost, and the foraging areas. Within the home range, owls appear to have core areas that are heavily and repeatedly used. Individual core areas (*i.e.*, where 60 percent of radio responses occurred) averaged 336 acres and core areas for pairs averaged 398 acres. High use areas tended to correspond to steep slopes

(Ganey and Balda 1988). Although seasonal movements vary between owls, most remain within their summer home ranges throughout the year.

The diet of the Mexican spotted owl includes a variety of mammals, birds, reptiles, and insects with mammals making up the bulk of the diet throughout the owl's range. Woodrats (*Neotoma* spp.) are the most frequent prey, especially in rock canyon country (Johnson and Johnson 1985, Ganey and Balada 1988).

Ganey and Balada (1988) observed Mexican spotted owls feeding mainly by moving from tree to tree, spending from a few seconds to several hours, watching and listening for prey. Because spotted owls launch their attack at relatively short distances from their prey, a multistoried forest, with its many potential perches, is advantageous to owls seeking food.

Spotted owls have plumage like boreal-zone owls, apparently as an adaptation for periods of winter stress. They are inefficient at dissipating body heat. Apparently to compensate for this inefficiency, they roost and nest in areas of mature forest with a dense multilayered canopy, often on a north slope, near water, or in a canyon that receives cold air drainage. Such sites are 1 to 6 degrees Celsius cooler than other nearby habitat (Barrows and Barrows 1978, Barrows 1981).

Hawks and great horned owls prey on Mexican spotted owls. Great horned owls were the suspected predator of three radio-tagged Mexican spotted owls (Ganey and Balda 1988, Skaggs 1990). There is some habitat overlap between the two species, but great horned owls occur most often in areas of low relief in selectively logged forest or along meadow edges while spotted owls occur mainly on steep slopes containing dense forest. Johnson and Johnson (1985, 1990) and Phillips *et al.* (1964) report circumstantial evidence that Mexican spotted owls abandon habitat invaded by great horned owls.

Young *Strix* owls suffer from avian predation (Southern 1970, Gutierrez *et al.* 1985). Young northern spotted owls are especially vulnerable during development, following fledging, and during early dispersal (Forsman *et al.* 1984, Gutierrez *et al.* 1985, Miller and Meslow 1985). Skaggs (1988) saw a red-tailed hawk (*Buteo jamaicensis*) almost succeed in capturing a Mexican spotted owl and a red-tailed hawks was the suspected predator of a Mexican spotted owl in one radio-monitoring study (Skaggs 1990).

Federal, State, Indian, and private lands provide habitat for the Mexican spotted owl. The USFS, BIA, NPS, and Bureau of Land Management (BLM) are the Federal land managing agencies. Efforts to estimate suitable habitat and survey for owls have varied between agencies with by far the most intensive work being done by the USFS.

The USFS estimates it manages 4,698,807 acres of suitable owl habitat (Fletcher 1990; USFS, *in litt.*, 1990; USFS, *in litt.*, 1990), which occurs on 18 national forests. Along with presently suitable habitat, the USFS estimates another 1,040,000 acres of Arizona and New Mexico national forest lands are capable of becoming suitable in the next 10 to 100 years (Fletcher 1990). These lands were suitable in the past but became unsuitable due to timber harvest or natural causes. Timber harvest accounted for the loss of 816,000 acres and natural causes accounted for the loss of 221,000 acres. The USFS estimates 79 percent of these lands will require 50+ years to return to suitable owl habitat.

The USFS began Mexican spotted owl inventories in New Mexico and Arizona in 1988. Inventories in Colorado and Utah began in 1990. To date, just over 2,000,000 acres have been inventories (Fletcher 1990; USFS, *in litt.*, 1990 USFS, *in litt.*, 1990). Approximately 70 percent of the surveys have been on lands available for timber harvest.

USFS inventories have resulted in establishing 517 Mexican Spotted Owl MT's in Arizona and New Mexico with each MT representing the occurrence of either a single owl or pair of owls. Approximately half the MT's were established from confirmed nest or roost localities; the other half were established only from night calling responses. On lands unavailable for timber harvest, only 30 percent of the MT's were established from confirmed nest or roost localities. There are 318 MT's (61 percent) on lands available for timber harvest and 199 MT's (39 percent) on lands not available for timber harvest. Among the MT's on lands not available for timber harvest, 102 are on lands unsuitable for timber harvest, 39 are on lands withdrawn from timber harvest, and 58 are on reserved lands such as wilderness areas (Fletcher 1990).

There are potentially up to 878,000 acres of spotted owl habitat on Indian reservations. However, the actual amount of habitat is likely much lower because estimates supplied by the BIA Forestry Division were developed mostly from timber-type maps containing little information about understory conditions or slope. Also, habitat estimates for the Mescalero Apache, Jicarilla Apache, Southern Ute, and Zuni reservations represent the total commercial forest land for those reservations because no potential habitat estimates were supplied.

Formal owl surveys were conducted on 71,200 acres on four Indian reservations in 1990 and 15 owls were located. Owls presently known from Indian reservations total 5 pairs and 22 single owls (BIA, *in litt.*, 1990; BIA, *in litt.*, 1990; BIA, *in litt.*, 1990).

Potential owl habitat on BLM lands in Colorado, Utah, and New Mexico totals 711,000 acres (BLM, *in litt.*, 1990; BLM, *in litt.*, 1990; BLM, *in litt.*, 1990). No estimates of owl habitat were provided by BLM for its lands in Arizona.

Owls presently known from BLM lands in Colorado, Utah, and New Mexico total 1 pair and 5 single birds. There are 1 pair and 2 singles in Utah, 3 singles in Colorado, and no birds in New Mexico. BLM provided no information about owl records on its lands in Arizona.

Most owl habitat on national parks and monuments consists of steep shaded canyons in the northern part of the owl's range. It is difficult to estimate acreages for this type of habitat. The NPS estimates between 238,100 and 437,600 acres of spotted owl habitat for 23 parks and monuments in the Southwest (NPS, *in litt.*, 1990; NPS, *in litt.*, 1990; Johnny Ray, NPS, Grand Canyon National Park, pers. comm., 1990).

Owls presently known from NPS lands total 8 pairs and 16 single birds on 7 parks (NPS, *in litt.*, 1990; NPS *in litt.*, 1990; Ray, NPS, pers. comm., 1990).

New Mexico State lands totalling between 177,400 and 202,400 acres contain forests and canyons that could be suitable owl habitat but no owl surveys have been conducted (New Mexico Department of Game and Fish (NMDGF), *in litt.*, 1990). In Arizona, no suitable owl habitat is known to occur on State lands controlled by the Arizona Game and Fish Department (AGFD). No present or historic owl localities are known from State lands in New Mexico or Arizona. No information has been obtained on suitable owl habitat on State lands in Utah and Colorado.

Ganey and Balda (1988) surveyed throughout Arizona for spotted owls from 1984 through 1987. They reported 3 of 146 owl sites were on private lands, but gave no locations or habitat information. Skaggs (1988) reported seven owl records from southern New Mexico during the period 1900 to 1987 were from private lands. These records from Hidalgo County in southwest New Mexico represent sightings in the Animas Mountains. Spotted owls are reported currently present in the Animas

Mountains (Ault, USFWS, pers. comm., 1990).

Suitable spotted owl habitat reported by Federal and State agencies totals about 6,815,557 acres. The USFS reported 4,698,807 acres (69 percent), BIA 878,000 acres (13 percent), BLM 711,000 acres (10 percent), NPS between 238,100 and 437,600 acres (about 5 percent), and the State of New Mexico between 177,400 and 202,400 (3 percent). An estimate of 5,000 acres of suitable owl habitat on private lands is much less than 1 percent of the total.

The proportion of total habitat for each agency is probably fairly accurate. However, the total acreage of suitable habitat is likely overestimated. The error is a consequence of inadequate information on land status and a possible misinterpretation of the types of communities that provide suitable habitat. Several agencies expressed uncertainty about the accuracy of their habitat estimates.

From the data provided by various agencies, it is impossible to develop an accurate estimate of total suitable owl habitat. The Service's best estimate excludes the ponderosa pine community type for New Mexico and Arizona national forests because this community type was found to be used insignificantly by nesting and roosting owls. Although the ponderosa pine community type might also be excluded for Colorado national forests and Indian reservations, this was not done because figures from those sources did not report habitat by community type. The Service estimate of total suitable Mexican spotted owl habitat in the U.S. is 5,389,734 to 5,614,734 acres.

Ninety-one percent of Mexican spotted owls presently known occur on national forests, 4 percent occur on Indian reservations, 4 percent occur on national parks, and 1 percent occur on BLM lands. Despite only limited surveys by some agencies, estimates of suitable habitat indicate these percentages will not change significantly in the future.

Management direction for lands with owl habitat varies by agency. The management emphasis is timber production on much USFS and BIA managed land. Much BLM owl habitat is managed primarily for wildlife and recreation but is still available for natural resources extraction, including oil, gas, minerals, and timber. NPS lands are managed for recreation and preservation of natural values. State lands in blocks large enough to support owl populations are usually game management areas. Management of private lands providing owl habitat is unknown.

Most commercial timber in the Southwest is managed as even-aged stands using a system called shelterwood management. The shelterwood management system begins in a timber stand 100 to 140 years old with a commercial harvest called a regeneration cut. This cut removes most of the timber but leaves some trees to provide shade and a seed source for the newly developing stand. After a new stand of young trees is established in 10 to 40 years, a commercial harvest called a removal cut removes the sheltering overstory trees. Young stands receive precommercial thinning to maintain tree spacing for maximum growth. Once trees reach commercial size, stands are periodically thinned with commercial harvests called intermediate cuts. There are usually one to three intermediate cuts prior to the next regeneration cut.

About 95 percent of the USFS commercial timber in the Southwest is managed with the shelterwood system. Commercial forests on the Navajo Indian Reservation are being converted to shelterwood management (James Carter, BIA, pers. comm., 1990). Other commercial forests on Indian lands in the Southwest are managed as uneven-aged stands by use of selective logging.

On December 22, 1989, the Service received a petition submitted by Dr. Robin D. Silver requesting the listing of the Mexican spotted owl as an endangered or threatened species under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). On February 27, 1990, the Service accepted the petition as presenting substantial information indicating that listing might be warranted and initiated a status review.

Section 4(b)(3) of the Act requires the Secretary of the Interior to reach a final decision on any petition accepted for review within 12 months of its receipt. In conducting its review, the Service published a notice in the **Federal Register** (55 FR 11413) on March 28, 1990, requesting public comments and biological data on the status of the Mexican spotted owl. In addition, a status review team of five Service biologists and one biologist each from the Arizona Game and Fish Department (AGFD) and the New Mexico Department of Game and Fish (NMDGF) was established. This team organized all comments and information received in response to the March 28 notice as well as other information gathered or in the Service's files. A draft status review report was prepared by the team.

On December 6, 1990, the status review team completed the draft status review report on the Mexican spotted owl. On February 20, 1991, the Service made a finding, based on the report, that listing the Mexican spotted owl pursuant to section 4(b)(3)(B)(i) of the Act was warranted. Notice of this finding was published in the **Federal Register** on April 11, 1991. This proposed rule constitutes the final 1-year finding for the petitioned action.

The entire spotted owl species (*Strix occidentalis*) is listed on the Service's Animal Notice of Review as a category 2 species. A category 2 species is one for which listing may be appropriate but additional biological information is needed. The information gathered in the status review for the Mexican spotted owl contributed to the information needed for a decision to propose this subspecies for listing.

Summary of Factors Affecting the Species

Section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*), and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Mexican spotted owl (*Styrix occidentalis lucida*) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* Current surveys have shown Mexican spotted owls occur overwhelmingly in forests with distinct "mature forest" characteristics. Owls are associated with forested mountains and canyons containing dense uneven-aged stands with a closed canopy, as is typically seen in the mixed-conifer community type. While these characteristics are mostly found in mixed-conifer forests, ponderosa pine/Gambel oak forests are also used if old enough to exhibit a high incidence of large cavity trees, broken tops, numerous snags, and a heavy accumulation of downed woody material.

Significant portions of Mexican spotted owl habitat have been lost or modified. These impacts have taken several forms, and represent continually increasing pressures from local and regional human populations. Cumulatively, they have reduced spotted owl habitat significantly throughout its range.

Fletcher (1990) provided an estimate of spotted owl habitat loss on USFS lands in Arizona and New Mexico, expressing it as habitat "made capable."

He defines "capable habitat" as habitat ". . . suitable at some time in the past and became unsuitable due to natural or man-caused events . . . and it is capable of becoming suitable Mexican spotted owl habitat at some time in the future." An estimated 1,037,000 acres of owl habitat have been coverted from suitable to capable. Of this, 816,000 acres (78.7 percent) were due to human activities (mostly timber harvest) and 221,000 acres (21.3 percent) were due to natural causes (mostly fire).

Fletcher (1990) also provided a breakdown of acreages by the length of time required for capable habitat to return to suitable. However, recovery periods for the habitat "made capable" due to timber harvest (78.7 percent) are irrelevant because any acreage placed under the evenaged shelterwood management system used on most USFS timberlands in the Southwest must be considered indefinitely unsuitable as spotted owl habitat. For example, a regenerating, middle-aged stand of "capable" habitat might be within 50 years of recovering to suitable status. Under the shelterwood system, the stand will receive intermediate cuts before then, removing it again to a distance of many years from being suitable. Ultimately, the stand will be re-entered with another regeneration cut where all but a few trees are removed. Thus, after the critical attributes of owl habitat have been lost, shelterwood acres are held perpetually as "capable habitat" unless silvicultural management is altered. Suitably as owl habitat is never recovered or, at best, is recovered only briefly before the forest is re-entered and returned to "capable" status. Therefore, all past and projected acres of owl habitat placed under shelterwood management should be considered lost indefinitely as owl habitat. About 95 percent of the USFS commercial timberland in the Southwest is managed using the shelterwood system. Commercial timberland on the Navajo Indian Reservation is being converted to shelterwood management. Commercial timberland on other Indian reservations in the Southwest is managed predominately through selective logging to produce uneven-aged stands.

Fletcher (1990) reported 3,365,000 acres of currently suitable habitat in New Mexico and Arizona national forests. Conversion of 1,037,000 acres from suitable to capable represents a 23.5 percent loss of suitable habitat over an unspecified, but recent number of years. Forty percent of the loss occurred since 1980 (Fletcher 1990), which represents a habitat loss rate of approximately 10 percent in the last decade on Arizona and New Mexico national forests.

Data on owl habitat loss from lands other than Arizona and New Mexico national forests are not available. National forests in Arizona and New Mexico manage approximately 90 percent of known owl locations.

There are some indications that the spotted owl historically ranged into middle and low elevations in well developed riparian woodland communities. Bendire's (1892) location for nesting owls northwest of Tucson would have been in the extensive historical riparian gallery forests of the Santa Cruz River and its major tributaries. His sighting near the confluence of the Santa Cruz River, Rillito Creek, and Cānada del Oro was also at the base of the Santa Catalina Mountains near typical conifer forest habitat currently occupied by owls.

Riparian woodlands in the Southwest prior to the twentieth century may have satisfied many of the structural and thermal requirements of owl nest and roost sites. Dense cottonwood canopies and willow/mesquite understories could have provided a multistoried structure and cool microclimate. The historical presence of surface water below these gallery forests no doubt also ameliorated the surrounding desert thermal regime. The high diversity and abundance of potential prey items may have made these middle and low elevation riparian habitats suitable breeding locations. Arizona has lost more than 90 percent of its low elevation riparian habitat since the mid-1800's (State of Arizona 1990) and losses in New Mexico may be comparable. If this community type was used extensively by spotted owls, the loss of habitat has been considerable.

Duncan (1990) documented a recent breeding season owl location in a mid-elevation riparian area, also in southeastern Arizona. Single owls have been observed in winter in mid-elevation riparian areas in central Arizona (J. Ganey, Northern Arizona University, pers. comm., 1989; T. Lister, AGFD, pers. comm., 1989). Winter locations at low elevations have also been recorded in New Mexico (Skaggs, New Mexico State University, pers. comm., 1989). These contemporary records suggest riparian habitats could indeed have provided suitable owl habitat in the past.

Mexican spotted owl habitat faces destruction and modification at a rate equal or exceeding that of recent decades. These impacts take several forms and generally represent increasing pressures from growing local and national human populations. Cumulatively, they present a significant threat to the continued existence of the owl throughout its range.

Southwestern national forests primarily use the shelterwood harvest technique, which manages for even-aged stands. Thus, the uneven-aged, multistoried stands comprising primary owl roost and nest sites will be converted to unsuitable even-aged stands with reduced structural diversity.

Forest Plans for 5 of the 11 New Mexico and Arizona national forests now contain provisions to allow cable or skyline logging on slopes greater than 40 percent. The Gila National Forest Plan (USFS 1986a) suggest total timber harvest for that forest could be maintained at the present 30 million board feet (MMBF) per year allowable sale quantity (ASQ) by entering steep slopes, with as much as 50 percent of the forest's total timber volume coming from this habitat in five decades. The Lincoln National Forest Plan (USFS 1986b) specifies 4,850 acres of steep-slope logging during the 10 years covered by the plan, and the Santa Fe National Forest Plan (USFS 1987) calls for harvest of 1.5 million board feet annually by skyline logging.

These steep slopes have not been harvested to any degree in the Southwest in the past. Steep slopes typically provide superior spotted owl habitat by virtue of the owls' preference for the topography, rock outcrops and/or cliffs, and the generally cooler microclimates often supporting multilayered mixed-conifer forest. Steep slopes may be particularly important in maintaining owl populations where they occur at the lower elevational limits of the owl's range. Steep slopes and deep canyons often provide pockets of mixed-conifer within wider areas dominated by vegetation inferior as spotted owl habitat (e.g., ponderosa pine or piñon-juniper). Thus, harvest of steep slopes could impact habitat that is very limited and critical to maintaining spotted owls in an area.

By virtue of entering steeper slopes, a greater proportion of timber harvested will be mixed-conifer, the primary owl habitat. Historically, much timber harvest in the Southwest was concentrated in the high value, easily accessed ponderosa pine forests on relatively flat or rolling terrain on plateaus of mesa tops. With continued timber demands and decreased availability of that resource, harvest is now moving increasingly into mixed-conifer and steep terrain. Because of diminishing yields of ponderosa pine, it

appears more mixed-conifer will have to be harvested to maintain timber output at present levels.

According to current Forest Plans, in the 10-year planning period from 1987 through 1996, Arizona and New Mexico national forests will enter 7.48 percent of harvest-suitable land with regeneration cuts (this is the cut in the shelterwood management system that removes the largest volume of wood per acre and initiates regeneration of a new stand from tree seedlings). At this harvest rate, in 100 years 74.8 percent of harvest-suitable acres will be placed under the even-aged shelterwood system and many of these acres will receive subsequent intermediate cuts to thin the stands for maintenance of minimum timber productivity. Of the estimated suitable owl habitat on Arizona and New Mexico national forests, 59 percent (1,987,000 acres) is available for harvest (Fletcher 1990). Seventy-four percent of this figure represents a 44 percent loss of total suitable owl habitat (1,486,267 of 3,365,000 acres) on national forest lands in Arizona and New Mexico. Based on Information in forest plans, the USFS predicts forest timber demand will increases 30 percent in 50 years and that national forest outputs will be adequate to meet the demand. If this increase is realized, future acres of harvest entry and corresponding owl habitat loss will be considerably greater than these figures indicate.

Overall, timber harvest rates remain controversial in southwestern forests. The AGFD has repeatedly expressed concern that current ASQ's are not scientifically derived, biologically realistic figures; in short, whether biological diversity, sustained yield, and even timber flow are in fact being provided as required by the National Forest Management Act. While the USFS (Fletcher 1990) reports yearly decreases in total numbers of acres entered from 1980 through 1990 in New Mexico and Arizona national forests, average board feet harvested per acre has increased each year from approximately 2,750 board feet per acre to almost 4,000 board feet per acre. Forest Plans are now being reviewed by the USFS on five national forests in Arizona and New Mexico because of concern the ASQ could not be maintained while meeting other Forest Plan standards and guidelines. The Coconino, Apache-Sitgreaves, and kaibab national forests have reduced the volume of timber that will be offered for sale by about 15 percent while doing these reviews (Jolly, USFS, *in litt.*, 1990). It is unknown how forest management recommendations from these reviews will affect rates of spotted owl habitat loss.

Forest Plans indicate recreational use of most national forests will increase significantly in future decades. This will increase various activities that often overlap with owl habitat. The severity of impact will vary with the type of activity (e.g. road and trail building, camping, picnicking, shooting, hiking, hunting, skiing, and ORV-riding). Cumulatively, these activities may affect local owl populations and their habitat near pubic access areas.

Specific data on habitat loss in Mexico are not available. The few owl records are, as in the United States, closely associated with relatively undisturbed, forested mountains and canyons. The protection once afforded the species in Mexico by the remote, rugged habitat has now largely disappeared before a rapidly growing human population, expanding road system, increased mechanization, and forestry practices.

Under present conditions in Mexico, there are no incentives to practice responsible forestry. Mexican forestry programs receive little or no state or Federal funding; instead, they depend for their budgets on what they can collect from timber harvest activity. To compound the problem, the government owns the land, but the people own the resources such as the trees. As a consequence, there is no incentive to practice sustained yield forestry or to undertake reforestation. Instead, a premium is placed on maximizing immediate profits from the land.

The future outlook is for accelerated deforestation throughout the range of the spotted owl in Mexico. A proposal financed by the World Bank and aimed at the Copper Canyon region of western Chihuahua would extract more than four billion board feet of lumber from nearly 20 million acres over 6.5 years.

An estimated 2,191,000 acres of habitat, or 39 percent of the total currently suitable Mexican spotted owl habitat in the United States is not available for timber harvest. However, these lands are often scattered small units incapable by themselves of supporting a viable spotted owl population. Within Forest Service lands in Arizona and New Mexico, Fletcher (1900) reported 1,378,000 acres of suitable owl habitat is not available for logging with 53 percent of this land being on two forests (Gila National Forest, 453,000 acres; Santa Fe National Forest, 288,000 acres). There are about 550,000 acres of spotted owl habitat in national forest wilderness areas in New Mexico and Arizona. There are no figures for acres of owl habitat in wilderness areas in Utah and Colorado.

Except for Forest Service wilderness areas, NPS lands are the only other contiguous units of habitat excluded from logging. The NPS reports administering an estimated 238,000 to 438,000 acres of spotted owl habitat managed to preserve natural values. The wide range in the estimate reflects NPS uncertainty about which habitats are actually suitable for owls. This is partly due to NPS habitat being mostly comprised of the less typical canyonland habitat, and often at the northern limits of the Mexican spotted owl's range where owl occurrence is more difficult to predict.

Bureau of Land Management lands have been logged minimally, if at all, in the past. Pressure to harvest timber on BLM lands could increase if available timber in national forests decreases. The quality of owl habitat on BLM lands is probably lower than for other public lands because it generally is not contiguous and not associated with suitable owl habitat managed by other agencies.

Habitat fragmentation is the conversion of forest habitat from large, contiguous tracts into parcels that are individually small, collectively a fraction of the original area, and isolated from one another. Most USFS timber harvest in the Southwest is done in relatively small cutting units using even-aged management under the shelterwood system (Fletcher 1990). The spotted owl is an interior forest bird largely dependent on uneven-aged forests. By modifying and fragmenting uneven-aged forests, timber harvest as currently practiced in the Southwest will likely decrease habitat suitability for supporting self-sustaining and well distributed populations of the spotted owl (Green 1988, Harris 1984, Harris *et al.* 1982, Meslow *et al.* 1981, Spies and Franklin 1988, Thomas *et al.* 1988).

On the large scale, fragmentation will isolate larger contiguous populations into increasingly smaller and more isolated clusters of breeding pairs, by reducing the overall quality of available suitable nesting, roosting, and foraging habitat. In addition to a reduction in total owl numbers, this isolation may create dispersal and genetic problems for the population. Currently, a portion of the overall spotted owl population already exists in relatively isolated clusters of birds in the Colorado Plateau canyonlands of the north and the basin-and-range mountains of the south. These sections of the owl's range fall outside the relatively contiguous and more

densely populated habitat of central Arizona and New Mexico. Habitat fragmentation of this core population in central Arizona and New Mexico could have serious implications for this stability of the spotted owl population as a whole.

Small-scale fragmentation will erode the quality of home range habitat for individual owls. Fragmentation on a cutting-unit level can degrade habitat for spotted owls by affecting prey availability, interfering with primary hunting technique, and destroying the crucial microclimate attributes of the nest/roost sites. Simultaneously, this level of fragmentation likely enhances habitat quality for spotted owl competitors and predators like great horned owls and red-tailed hawks. Increased predation and competition may combine with decreased nesting success (due to habitat degradation and reduced prey availability, especially in the first weeks after owlets have hatched) to severely impact the Mexican spotted owl.

B. *Overutilization for commercial recreational, scientific, or educational purposes.* The main potential for overutilization of the Mexican spotted owl is through scientific activities that will likely increase with increasing interest and funds available for owl studies. In one instance, the NMDGF (*in litt.*, 1990) withdrew a permit to capture and radio-tag several owls because simultaneous Forest Service owl surveys documented their scarcity. The permit was revoked after it became apparent that the owl population was too small to support the research activities. This circumstance may become common for the spotted owl, which sometimes exists in small populations on isolated mountain ranges.

Recreational (bird watching), educational (classroom field trips), and public relations (agency "show me" trips for public and press) activities are also likely to increase this owl becomes better known. The owl's gentle nature makes it relatively easy to observe from close distances.Numerous authors have noted the bird's affinity for secluded owl-growth habitat infrequently visited by man. Except for a few individual owls, which may represent atypical behavior, the owls' tolerance of frequent human disturbance is unknown (Johnson and Johnson 1990).

C. *Disease of predation.* Great horned owls are a suspected major cause of mortality in Mexican spotted owls (Ganey and Balda 1988, Skaggs 1990). The two species have always had overlapping ranges, but habitat use has historically separated them ecologically. However, present forest management is changing traditional spotted owl habitat to resemble the "open" forest typically used by the great horned owl. Such management is usually done in patches distributed throughout the forest (fragmentation), which creates edge (ecotone) suitable to the great horned owl and increases the likelihood of contact between the two species. Spotted owls appear to avoid ares used by great horned owls (Hamer 1988, Johnson and Johnson 1985, 1990).

The more than 2 percent average annual increase in the number of great horned owls noted on the U.S. Fish and Wildlife Service annual Breeding Bird Survey in New Mexico and Arizona over the last 22 years is evidence of the "opening up" of forests in the Southwest. A similar increase (over 2 percent a year) has been recorded for the red-tailed hawk in Arizona and New Mexico. Red-tailed hawks are known to prey on spotted owls (Skaggs 1988, 1990) and also prefer the more open habitat created by forest fragmentation.

D. *The inadequacy of existing regulatory mechanisms.* The Migratory Bird Treaty Act provides the only Federal protection for the Mexican spotted owl. Under the provisions of the MBTA it is unlawful to pursue, hunt, take, capture, or kill in any manner any migratory bird. Although the Mexican spotted owl remains in its summer range throughout the year, it is included on the list of birds protected under the MBTA.

An interagency agreement with the purpose of ensuring population viability of the spotted owl (*Strix occidentalis*), including the Mexican spotted owl, was signed by the Service, BLM, NPS, and USFS on August 12, 1988 (U.S. Department of the Interior 1988). Under this agreement, each agency agrees to manage its lands to provide owl habitat, to carry out habitat and population inventories sufficient to indicate long term trends, and to carry out research activities sufficient to provide empirical information on the validity of planning assumptions. The degree to which this agreement has been implemented has varied among agencies. Coordination between agencies attributable primarily to the agreement has been minimal.

No state or Indian nation other than the State of Arizona protects the Mexican spotted owl under its endangered or sensitive species law. Arizona currently lists the Mexican spotten owl as threatened on its "List of Threatened Native Wildlife in Arizona" (AGFD 1988). Capture, handling, transportation, and take of the owl are regulated by game laws and special licenses for live wildlife. Thus, Arizona only regulates hunting, recreation, and scientific investigation.

Most Federal agencies have policies to protect state threatened or endangered species and some agencies also protect species that are candidates for Federal listing, such as the Mexican spotted owl. The National Park Service Organic Act protects all wildlife on national parks and monuments. The problem with these general policies is a lack of standards or guidelines that can be used to measure policy success. Until agencies develop specific protection guidelines, evaluate them for adequacy, and test them through implementation, it is uncertain whether any general agency policies will adquately protect the Mexican spotted owl.

Specific management policies for the spotted owl have been developed by BLM in Colorado and New Mexico. The policy in Colorado states, ". . . In areas with a confirmed nest or roost site, surface management activities will be limited and will be determined on a case by case basis to allow as much flexibility as possible outside of the core area." Management policy in New Mexico states that habitat core areas and territories of appropriate size will be established and preserved wherever owls are found. These policies are too general to ensure the spotted owl will be adequately protected on BLM lands.

Spotted owl protection guidelines have been developed by only one Indian nation. These guidelines for the Mescalero Apache Reservation establish a 72 acre buffer zone around owl roost or nest sites. No management activities can occur within the buffer zone during the reproductive season. After the reproductive season, the buffer is reduced to a 150 foot radius (5.1 acres) around significant roost areas and a 200 foot radius (9 acres) around nests. It is doubtful these guidelines provide any meaningful protection for spotted owl pairs, which have an average home range of 2,092 acres.

Detailed guidelines for spotted owl management have been developed by the USFS Southwest Region. These guidelines were first issued as Interim Directive No. 1) (ID No. 1) in June, 1989, and reissued as Interim Directive No. 2 (ID No. 2) in June, 1990. The current guidelines expire December 26, 1991. The ID's apply only to national forests in New Mexico and Arizona. No spotted owl management guidelines have been developed for Colorado or Utah national forests. The ID's require establishment of a Mexican Spotted Owl Management Territory (MT) around each spotted owl nest or roost site. Each MT (except those on the Gila and Lincoln national forests) has a core area of 450 acres and an overall size of 2,000 acres. Activities

within the core area are limited to road construction. Within the overall MT, activities are limited to a maximum of 775 acres, which will usually be timber harvest. The intent of the guidelines is to retain at least 1,000 acres of suitable habitat within the MT after proposed management activities are identified and located. USFS estimates indicate suitable habitat within MT's currently averages 1,150 acres.

MT size and entry limitations were based on average values found by Ganey (1988) for radio-monitored birds. Ganey's work is the only study of its type for the Mexican spotted owl. The USFS uses average rather than maximum values for MT size, thereby establishing MT's that meet size and habitat requirements for only about 50 percent of spotted owls.

Application of the ID's has not been uniform for all forests. Guidelines on two forests were modified. ID No. 1 reduced the core area size to 300 acres for the Lincoln National Forest. ID No. 2 established a core area size of 450 acres for all forests but reduced the overall territory size to 1,500 acres for the Lincoln and Gila national forests. Both forests have significant owl populations and severe conflicts with planned timber harvest volumes.

The ID's provide no protection for unoccupied suitable owl habitat. For instance, the Southwest Region forests report 35 historic owl sites where no MT's will be established. These sites were suitable habitat in the past and are likely still suitable if not modified by harvest activities.

E. *Other natural or manmade factors affecting its continued existence.* Forest fires have destroyed approximately 221,000 acres of suitable spotted owl habitat in New Mexico and Arizona national forests in recent years (Fletcher 1990). This acreage represents a loss of approximately 5 percent of the 4,402,000 acres Fletcher (1990) considered spotted owl habitat, and approximately 21 percent of the owl habitat recently made unsuitable. Fletcher estimated that 79 percent of the lost acres would require more than 50 years to return to suitable habitat. The future incidence of fire can be expected to remain fairly constant.

Malicious and accidental harm to spotted owls is rarely documented. Several road-killed owls have been found in Arizona and New Mexico, probably reflecting increasing human activities in owl habitat. No reports of accidental shooting are known. Malicious harm to owls have not been documented. However, as conflicts over spotted owls and forest management increase, and the methods for locating owls become widely known, the potential for malicious harm will increase.

The barred owl has undergone rapid range expansion over the past 20 years into the range of the northern spotted owl (Hamer 1988) and has replaced the northern spotted owl in some areas (Forsman *et al.* 1984). The barred owl has taken advantage of habitat modifications, such as those resulting from present forest management (fragmentation), to expand its range into areas where it may compete with the spotted owl. There are no records of barred owls in the U.S. range of the Mexican spotted owl, but the range and numerical expansion of the great horned owl and red-tailed hawk in the Southwest suggest that the barred owl could do the same. The Mexican subspecies of the barred owl (*Strix varia sartorii*) is known from much of the Mexican spotted owl's historic range in central Mexico (AOU 1983); the ecological relationship between the two there is unknown. The potential for interbreeding between Mexican spotted owls and barred owls merits concern and monitoring. Such interbreeding is reported with the northern spotted owl (Fletcher, USFS, pers. comm., 1990).

The Service has carefully assessed the best scientific information available regarding the past, present, and future threats faced by this species in determining to propose this rule. Based on this evaluation, the preferred action is to list the Mexican spotted owl as threatened throughout its range. Suitable habitat for this subspecies has been reduced by logging and fires. Habitat fragmentation is a consequence of forest management techniques that increases the threat of predation and inhibits dispersal. Only an estimated 2,160 Mexican spotted owls exist. Endangered status would not be appropriate because the available data do not indicate that extinction throughout all or a significant portion of the range is an imminent possibility.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is proposed to be endangered or threatened. For the Mexican spotted owl, the Service has concluded that designation of critical habitat is not prudent at this time. The Service's regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent if the species is threatened by taking or other human activity, an identification of critical habitat can be expected to increase the degree of such threat to the species, or if such designation of critical habitat would not be beneficial to the species.

The Mexican spotted owl typically habitats mountains and canyons containing dense, uneven-aged forests with closed canopies. These structural characteristics are most often found in older mixed conifer or ponderosa pine/Gambel oak forests that also exhibit a heavy accumulation of downed logs, numerous snags, and a high incidence of trees with large cavities or broken tops.

Mexican spotted owl habitat in the southwestern U.S. is managed nearly exclusively by Federal and state agencies. The agencies are the U.S. Forest Service (69 percent), Bureau of Indian Affairs (13 percent), Bureau of Land Management (10 percent), National Park Service (5 percent), and states (2 percent). Private lands that are suitable habitat are mostly inholdings within national forests and are usually in small parcels, incapable individually of supporting even a single owl much less a viable own population.

Timber production is the primary land use within spotted owl habitat. Approximately 65 percent of owl habitat in Arizona and New Mexico is managed for timber production. About 95 percent of USFS commercial timber in the Southwest is managed in even-aged stands (McDonald *et al.* 1991, Table 9, pg. 42). This management practice destroys the multi-storied, multi-aged conditions that are most desirable for owl habitat.

The predominate timber management conducted on USFS lands in the southwest uses a system called "shelterwood management." The even-aged tree stands that are regenerated after harvesting with this system are equivalent to those regenerated after clearcutting, except that with shelterwood management, timber removal is done in increments rather than all at once. Any acreage laced under the shelterwood harvest system must be considered indefinitely unsuitable as spotted owl habitat. To illustrate this point, a regenerating stand under the shelterwood system might be within 50 years of reaching suitable condition as owl habitat. However, the stand will receive intermediate cuts before then, distancing it again by many years from being suitable. Ultimately, the stand will be re-entered with a regeneration cut where all but a few trees are removed. Thus, after the essential attributes of owl habitat have been lost, shelterwood-managed acres are kept perpetually in an unsuitable habitat condition. Suitability as owl habitat is never recovered or, at best, is

recovered only briefly before the forest is re-entered and returned to unsuitable condition.

The USFS estimates 4.4 million acres of owl habitat on national forests in Arizona and New Mexico. Of this, 3.36 million acres (76 percent) are currently suitable and 1.04 million acres (24 percent) are currently unsuitable due to management activities (mostly logging) or natural causes (mostly fire) (Fletcher 1990, pgs. 3–12). Of the 1.04 million acres, USFS estimates that 31 percent will require 50 to 100 years to return to suitable condition and 47 percent will require more than 100 years to return to suitable condition. Habitat lost in the past regains its characteristics as owl habitat very slowly. And, as already discussed, if the land is placed under shelterwood management, it may never again regain its characteristics as owl habitat.

The USFS estimates 40 percent of the habitat loss occurred since 1980 (Fletcher 1990, pg. 36). This represents a habitat loss rate of 0.94 percent per year over the last decade. The Service estimate of habitat loss in the next decade based on Forest Plan harvest schedules is 0.4 percent per year (McDonald *et al.* 1991, pg. 60). This rate of owl habitat loss would not appear to be very great unless weighed against the extremely long time (100 years or longer) it takes for a forest to regain its characteristics as suitable owl habitat and the fact that impacted acreage also diminishes the functional value of an unknown number of acres of adjacent habitat.

Additional information in Forest Plans predicts demand for forest products will increase by 30 percent in the next 5 decades (McDonald *et al.* 1990, pg. 60). If this increase is realized, the rate of owl habitat loss will increase greatly over the predicted rate for the next decades. Provisions to log steep slopes are contained in 5 of the 11 Forest Plans for National Forests in Arizona and New Mexico (McDonald *et al.* 1991 pg. 42). Steep slopes have been logged minimally, if at all, in the past and contain some of the best remaining spotted owl habitat in the Southwest.

Habitat Fragmentation—Even though only a fraction of one percent of all habitat classed as suitable for owls may be cut in any one-year period, the effect of those cuts on adjacent habitat is cumulative and the proposed cuts are likely to be widely dispersed over nearly the entire range of the owl. Most such cuts will take 100 years or more to return to a condition suitable to support the Mexican spotted owl. The total number of acres of forest lands identified as suitable habitat for Mexican spotted owls overstate the amount of suitable habitat because of adjacent cuts. While the vegetation present may meet the criteria for being classified as suitable, adjacent past and future timber harvests both directly and indirectly diminish the value of the remaining habitat for spotted owl survival and recovery.

Removing some or all timber from one parcel affects the uncut habitat on all sides of it. By creating an opening in the forest canopy, the microclimate becomes warmer and drier both within the cut and around its margins. The influence of the wind increases. These changes modify the ecosystem upon which the owl and the prey species of the owl depend, contributing to imbalance between predator and prey. Removal of trees that serve as nest sites, roost sites or hunting perches directly reduces the likelihood that individual owls will endure degraded habitat conditions sufficiently to successfully reproduce or even survive under stressful environmental conditions. The open conditions make the area more suitable to predators and competitors of the owl. Cut parcels are no longer suitable for occupancy by dispersing owls and the adjacent uncut habitat is diminished in value to the local population of owls.

An uncut island of habitat remaining after surrounding habitat has been cut is diminished in value to an even greater extent. The entire margin is subject to the same ecological changes described in the preceding paragraph. The range of any remaining owls is sharply limited; the island is less suitable for individuals dispersing to it from elsewhere or may even be totally isolated to pioneering individuals. Because the island is diminished in size, future chance environmental events such as wildlife, windstorms, and insect tree damage can totally eliminate the habitat of small isolated populations (USFS 1988).

Many previously cut tracts within or adjacent to otherwise unbroken habitat are important for recovery of the owl and must be spared re-entry for further cuts if their value for recovery of the species is to be realized. Similarly, tracts undisturbed by cutting are directly important for survival. Consequently, it is essential that both currently suitable and currently regenerating tracts be considered together as whole units whenever consultation, in accordance with Section 7 of the Act, is undertaken on the effects of proposed Federal actions on the survival and recovery of the Mexican spotted owl.

The amount of habitat suitable for supporting the Mexican spotted owl is declining. The outlook is for that downward trend, if left unabated, to accelerate. Because the time required for its habitat to regenerate is on the order of 100 years, any action that will contribute significantly to the continuation of that trend will reduce appreciably the likelihood of both the survival and recovery of the Mexican spotted owl.

From the foregoing analysis, it is apparent that the Federal land management agencies are not taking the habitat needs of the Mexican spotted owl into account to an extent sufficient to ensure its survival and recovery. Listing of this subspecies will put the Section 7 consultation requirements in place, so that insufficiency will be alleviated. Thus avoiding an action that would appreciably diminish the value of habitat for both the survival and recovery of the owl would provide no additional protection beyond that of avoiding an action that would reduce appreciably the likelihood of both the survival and recovery of the owl by reducing its reproduction, numbers, or distribution. Ultimately, survival and recovery of the Mexican spotted owl depends on realizing that even small increments of habitat loss, if allowed to continue, will jeopardize the species. Therefore, any significant habitat alteration that will affect the ability of the habitat to provide the primary constituent elements necessary to ensure survival and recovery of the Mexican spotted owl must be avoided. To assure the availability of adequate habitat in the future, this protection strategy will have to be applied equally to occupied suitable habitat, unoccupied suitable habitat and presently unsuitable habitat that is capable of becoming suitable in the future. Because the formal designation of critical habitat would provide no additional benefit to the Mexican spotted owl through the Section 7 consultation process beyond that provided by listing per se, it is not prudent to make such a designation.

Conclusion—The particular circumstances of the Mexican spotted owl, as explained above, lead the Service to conclude that listing will provide the same level of protection that would occur with formally designated critical habitat. The designation of critical habitat would not be of additional conservation benefit to the Mexican spotted owl, so it would not be prudent to do so at this time. The finding of "not prudent" procedurally terminates the designation of critical habitat in this listing action, unless new information leads the Service to a different conclusion prior to the time the

listing is final. The Act provides, however, that critical habitat may be designated other than in direct conjunction with the listing of a species, and proposing to do so is not limited in time.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the act, as amended required Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR Part 402. Section 7(a)(4) requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may adversely affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

The U.S. Forest Service and some Indian nations have active timber sales programs in the Southwest. The BLM also participate in timber sale programs to a lesser degree. Because habitat loss and modification resulting from timber harvesting activities represent the primary threats to the Mexican spotted owl, any timber sales administered by a Federal agency would be subject to section 7 consultation. Other actions that may affect the Mexican spotted own such as road building, trail building, pipeline construction, powerline construction, mining, or construction of recreation facilities would also be subject to section 7 consultation between the Service and the appropriate Federal agency.

The Act and implementing regulations found at 50 CFR 17.21 and 17.31 set forth a series of general prohibitions and exceptions that apply to all threatened wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect; or to attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving threatened wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22, 17.23, and 17.32. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. For threatened species, there are also permits for zoological exhibition, educational purposes, or special purposes consistent with the purposes of the Act.

On June 28, 1979, the order strigiformes, which includes all owls was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The effect of this listing is that export permits are generally required before international shipment may occur. Such shipment is strictly regulated by CITES party nations to prevent effects that may be detrimental to the species' survival. Generally, the export cannot be allowed if it is primarily for commercial purposes.

Public Comments Solicited

The Service intends that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited. Comments particularly are sought concerning:

(1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to this species;

(2) The location of any additional populations of this species and the reasons why any habitat should or should not be determined to be critical habitat as provided by section 4 of this Act;

(3) The proposal that designation of critical habitat would not be prudent;

(4) Additional information concerning the range, distribution, and population size of this species; and

(5) Current or planned activities in the subject area and their possible impacts on this species.

Final promulgation of the regulation on this species will take into consideration the comments and any additional information received by the Service, and such communications may lead to a final regulation that differs from this proposal.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited herein is available upon request from the Field Supervisor, Albuquerque Ecological Services Field Office, (see **"ADDRESSES"** above).

Authors

The primary authors of this proposed rule are Charles McDonald, and Sonja Jahrsdoerfer, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103, (505) 766-3972 or FTS 474-3972.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Proposed Regulation Promulgation

PART 17—[AMENDED]

Accordingly, it is hereby proposed to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. It is proposed to amend § 17.11(h) by adding the following, in alphabetical order under "Birds", to the List of Endangered and Threatened Wildlife.

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common Name	Scientific Name						
*	*	*	*	*	*	*	
BIRDS							
*	*	*	*	*	*	*	
Owl, Mexican spotted	*Strix occidentalis lucida*	U.S.A. (AZ, CO, NM, TX, UT), Mexico.	Entire	T		NA	NA
*	*	*	*	*	*	*	

Dated: October 20, 1991.

Richard N. Smith

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 91–26510 Filed 11–1–91; 8:45 am]

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